

Exploring the Nexus between Economic Policy Uncertainty and *Shariah* Indices using ARDL and Quantile Regression

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Abstract: This study investigates the effects of economic policy uncertainty (EPU) on both *Shariah*-compliant and conventional stock indices at the Pakistan Stock Exchange (PSX). Thirteen years of monthly data (2010–2022) were utilized in this study, comprising 143 observations. The analysis was conducted using the Autoregressive Distributed Lag (ARDL) model and Quantile Regression to assess the impact on these indices. By focusing on Islamic *Shariah* indices, this research contributes to the existing literature and offers valuable insights for Islamic investors and financial policy-makers. These findings align investment strategies with the principles of *Maqasid al-Shariah* in Pakistan's financial markets. Additionally, the findings aim to bridge the gap between Islamic finance theory and practical investment decisions. While the current analysis is limited to the Pakistan Stock Exchange, future research could expand this framework to include other Muslim-majority nations, non-Muslim countries, transitional economies, and developed markets for broader comparative insights.

Keywords: ARDL Analysis, Economic Policy Uncertainty, Macroeconomic Variables, Quantile Regression, *Shariah* Indices

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➡ Khalid, M. U., Ahmed, Z., Mehmood, S., Daraksha, M. & Haris, Q. M. (2026). Exploring the Nexus between Economic Policy Uncertainty and *Shariah* Indices using ARDL and Quantile Regression. Turkish Journal of Islamic Economics, 13(2), 116-145.



Introduction

Stephen Ross's Arbitrage Pricing Theory, presented in 1976, confirms that stock prices and Indices react to changes in macroeconomic variables. The present study explores the hypothesis that economic uncertainty, along with macroeconomic variables, influences the *Shariah* indices of emerging economies such as Pakistan. Previous literature has mainly focused on developed economies and conventional stocks (Apriyadi, 2025; Ma et al., 2022; Ilyas et al., 2021; Kumar & Sahu, 2017). The Efficient Market Hypothesis (EMH) suggests that market efficiency depends on factors encompassing macroeconomic factors, risk levels, and trading volumes (Lahmiri et al., 2022). The Capital Asset Pricing Model (CAPM) is another influential financial theory that helps us study risk and return in financial markets. This study aims to analyze historical data on Islamic Indices, as Islamic financial markets have attracted investments from Muslim and non-Muslim investors. (Timur et al., 2025; Rakhmawati, 2022).

We examine an ever-increasing number of studies that have used the economic policy uncertainty index (EPU) as a key measure of uncertainty. In the aftermath of the COVID-19 pandemic, the world has been beset by constant economic uncertainty. Issues such as the bankruptcy of the Sri Lankan economy (Jayasuriya, 2022), Russia's war on Ukraine (Hamama-Raz et al., 2022), the departure of US armies from Afghanistan, and the resulting Taliban regime's rise to power (Akbari & True, 2022), the development of foreign infrastructure by China all over the world under its One Belt One Road initiative (Zou et al., 2022), the rise of India as the fastest growing population with projected figures exceeding those of even China (Hinz et al., 2020), and more recently, the Israel-Iran war conflict (Pinfold et al., 2025) are reshaping global economies and affecting the world in direct and indirect ways. The world has become a global village; events in one part of the world affect outcomes in another. These and similar events are creating economic uncertainty, leading to issues such as poverty, fuel price fluctuations, inflation, currency devaluation, income inequality, and unemployment. In light of these current issues, this study highlights the impact of economic uncertainty on financial policies and the financial market. We focus our review on analyzing how *Shariah* indices react in times of uncertainty and suggest further actions that could be taken.

The rest of the paper is structured as follows: Part 2 contains the literature review. Part 3 presents a brief discussion on the data and methodology adopted to address the problem. Part 4 discusses the empirical results and estimates. Finally, Part 5 concludes the study with suitable policy recommendations.

Literature Review

Prior research on the influence of economic policy uncertainty on conventional and Islamic financial markets has primarily relied on linear time-series models (Ftiti & Hadhri, 2019). Most earlier studies overlook potential asymmetries and distribution-dependent effects of EPU on Islamic equity markets. Reliance was placed upon asymmetric linear models (Hasan et al., 2023). Furthermore, the distributional behavior of returns has not been adequately assessed (Abbas et al., 2022). This study addresses this methodological gap by integrating the Autoregressive Distributed Lag (ARDL) and quantile regression methods. This allows for an examination of both long-run dynamics and tail-specific effects across diverse market scenarios.

Stock Indices and Consumer Price Index

Jaravel and O'Connell (2020) have attributed the precise and timely assessment of inflation to the formulation of economic policies. There have been other studies where researchers have examined the effects of these variables on Islamic countries as well, for instance, Abbas et al. (2022), Aziz et al. (2020), and Bahloul et al. (2017). Modigliani and Cohn (1979) share the same opinion. Moreover, some scholars, such as Haniff and Masih (2018), argue that Islamic stocks offer an additional advantage by providing a hedge against inflation. However, other authors, such as Davig et al. (2011), argue that inflation results in higher tax rates being borne by companies. Thus, it is safe to deduce that inflation is inversely proportional to returns to investors (Muckenhaupt, 2025; Ogbuabor & Malaolu, 2024).

Economic Policy Uncertainty

Economic policy uncertainty (EPU) has been a subject of continuing interest in recent times (Khalid & Iqbal, 2025; Fernandes et al., 2022; Aslam, 2022; Ghosh & Bagchi, 2023; Soni et al., 2023). Prominent measures include the EPU indices of Baker et al. (2016), Arbatli (2017), and Moore (2017), the geopolitical risk index of Caldara et al. (2022) and the uncertainty Index based on Google trends by Castelnuevo and Trung (2017). EPU, however, has gained more consideration than other uncertainty measures in times of prominent financial, geopolitical, or economic crises such as, most recently, the COVID-19 lockdown (Al-Thaqeb et al., 2022; Altig et al., 2020) the Russia -Ukraine war (Shen & Hong, 2023; Mbah & Wasum, 2022), United States troops withdrawal from Afghanistan (Stepanova, 2022; Jalali, 2021), China-USA trade wars (Kwan, 2020; Li et al., 2018), the global financial crisis of 2008 (Moudud & Akter, 2022), and the United Kingdom (UK) exit from the European Union (EU) in 2020 (Stanič & Bowden, 2023). In this regard, the

impacts of EPU have been wide-ranging on output (Baker et al., 2016), financial markets (Ghosh & Bagchi, 2023), investment decisions (Chu & Fang, 2021), and the economy (Ghirelli et al., 2019). There are instances of EPU impact even in African nations and emerging economies (Iddrisu et al., 2025; Obenpong et al., 2024; Ekeocha et al., 2023; Ali et al., 2023).

Foreign Trade (Exports/Imports)

Stock markets are often referred to as barometers of economic activity (Kartal et al., 2021); thus, they respond acutely to news, announcements, changes in import tariffs, duties, and other factors. That is why news regarding macroeconomic or financial indicators, such as foreign exchange (FX), foreign trade, economic growth, current account deficit, employment, and interest rates, can be impactful on stock indices (Wei et al., 2019).

Interest Rates (KIBOR)

Cornell (1983) hypothesized that declines in stock prices are due to changes in nominal interest rates. Low interest rates increase companies' dividends (Conrad, 2021; Wong, 2022; Mpofu et al., 2023). However, there is something to note here: Muslim faith-based investors, particularly those investing in *Shariah* indices, may not be attracted to bank interest and may maintain their investments in equity funds due to their religious prohibition on *riba* (Uddin, 2022; Azam et al., 2019).

Foreign Direct Investment

Foreign Direct Investment (FDI) is seen as a significant strength and indicator of confidence in any economy worldwide (Saidi et al., 2020). Economists, researchers, and policymakers alike see it as a fundamental instrument for achieving economic prosperity. (Khan et al., 2021). Every country sees foreign investment as a source of economic prosperity, as it increases production of goods and services, reduces unemployment by creating more jobs, and raises the overall standard of living (Chen, 2021). For a country like Pakistan, which has been plagued by terrorism (Abbas et al., 2021), both internal (Khan & Ahmed, 2019) and external (Durrani & Crossouard, 2020), the importance of FDI increases manifold. (Muhammad et al., 2022). To address all the above, Pakistan relies heavily on foreign investments and remittances from Pakistanis working abroad (Tahir et al., 2020; Rejeb & Arfaoui, 2019).

Stock Indices and Taxes

Taxes are deducted directly from the companies' profits. Therefore, it is no secret that companies want to pay fewer taxes and earn more profits. Higher earnings mean higher stock prices on the exchange. Managers, as per agency theory, should present the companies' financial statements in the best possible way to reflect the companies' performance and, in turn, their efforts to run the company (Fauzi, 2019; Verma et al., 2021).

Stock Indices and US Dollar Rate

The US dollar has been acknowledged as the global reserve currency, thus creating global imbalances (Kocaarslan & Soytaş, 2021). Investors perceive the US dollar as a haven in times of uncertainty and heightened global risk exposure. People often ponder whether to keep their investments in gold, the US dollar, or stocks. Investors react differently to positive or negative shocks of exchange rates, gold prices, and interest rates (Umaid et al., 2020). When the Rupee depreciates against the US dollar, stocks become cheaper, thus prompting investors to convert dollars into Rupees to profit from this anomaly. Similarly, if the Rupee appreciates against the US dollar, investors might sell their stocks to profit from currency fluctuations (Mahalakshmi et al., 2022).

Stock Indices and Money Supply (Currency in Circulation)

Theory suggests that an increase in money supply may raise or lower stock prices. The reason is that money supply affects the discount rate (Bhuiyan & Chowdhury, 2020). Furthermore, as the money supply rises, the interest rate declines, thereby lowering the discount rate for expected profits from future cash flows (Jufri & Sakinah, 2022). Their findings depict that expansionary monetary policy increases cash flow in the economy and strengthens the country's financial system.

Stock Indices and Oil Prices

Equity valuation theory can explain that oil price changes are reflected in stock returns through the imposition of production costs (Mishra et al., 2019). The theory holds that prevailing stock prices reflect the present values of all expected future cash flows (Pinto et al., 2019). Several studies on the effects of oil prices on stocks have found that both positive effects (Chang et al., 2020; Mishra et al., 2019; Singhal et al., 2019) and negative effects (Kumar, 2019; Demirer et al., 2020), as well as no effect (Ftiti & Hadhri, 2019). Lastly, oil-exporting nations tend to behave

differently from oil-importing nations (Mishra et al., 2019). Pakistan, as an oil-importing nation, is subject to a negative association with stocks when foreign oil import prices often lead to inflation (Sarwar & Maqbool, 2020).

Digital Islamic Banking Adoption

Digital Islamic banking is growing rapidly worldwide, especially in Pakistan. This shift is making financial services easier, more transparent, and more accessible for people. When economic policy uncertainty rises, investors look for stability and trust. Islamic banks, especially Meezan Bank, offer this through *Shariah*-compliant practices and strong digital platforms. These digital services reduce delays, improve access to information, and help customers make faster decisions. As a result, Islamic stocks may hold up better during uncertain times because investors feel more confident in the system's transparency and reliability (Mawardi et al., 2025; Nasir et al., 2024). After COVID-19, people in Pakistan became more careful with their financial decisions. Many shifted to digital Islamic banking because it felt safer and more convenient. Mobile apps, online services, and contactless payments became a normal part of daily life. At the same time, rising economic policy uncertainty made consumers more risk-aware. They looked for trust, clarity, and ethical practices in their financial choices. This pushed more people toward *Shariah*-compliant products. Overall, customers now want Islamic finance that is simple, stable, and easy to access during uncertain times (Nosheen et al., 2024; Raza, 2024).

Data and Methodology

This study uses the economic policy uncertainty index developed by Baker et al. (2016) and published in 2016. To measure economic policy uncertainty, this index quantifies coverage of an economy in major daily newspapers. Several macroeconomic variables have a significant impact on both nominal and *Shariah* indices. We have selected a sample of 11 macroeconomic indicators from the World Bank's archival database, Pakistan Bureau of Statistics (PBS) and the Pakistan Stock Exchange website (PSX). All variables were collected monthly, with the sample data spanning 2010 to 2022. For all values, percentage changes have been calculated to address measurement singularity across variables that comprise percentages, Rupee values, currency exchange rates, etc. These macroeconomic Independent variables include the consumer price index (CPI), currency in circulation (Currency), the economic political uncertainty index (EPU), exports (EXP), imports (IMP), foreign direct investment (FDI), Karachi interbank offered rate (KIBOR), oil prices,

reserve of Pakistan's central bank (Reserves), tax collected (TAX), and US dollar exchange currency rate (USD). The two dependent variables used in this study are the Karachi Stock 100 Index (KSE 100) and the Karachi Meezan Index (KMI 30). For analysis, Eviews 10 software was used.

We began our analysis with non-stationary variables, as this is a prerequisite for time-series modeling. This was followed by the autoregressive distributed lag model (ARDL), which was used to investigate the long-run and short-run effects of the above macroeconomic variables on the stock indices of both *Shariah* and non-*Shariah* indices in the context of Pakistan's economy. A correlation matrix was also used to identify and assess multicollinearity. The F-bound test was run to check for co-integration. Lastly, for enhanced analysis, quantile regression was used as an essential tool to evaluate performance at every 5th quantile, ranging from 0 to 100.

The ARDL model has several advantages over its predecessors. Firstly, the results remain reliable even with small sample sizes. Secondly, regardless of the integration order 1 or 0, the results can be useful (Hashmi & Chang, 2021). This is a unique feature, as other traditional VAR and VECM models can be used only when the variables are integrated at the same order (Hatmanu et al., 2022; Javangwe et al., 2022; Okumus et al., 2021). Thirdly, the model further facilitates the derivation of the Error Correction Model (ECM) (Li & Shao, 2022). Fourthly, ARDL models are free of residual correlation, which helps address endogeneity issues (Hashmi & Chang, 2021).

Econometric Methodology

The following equation is presented to study the variables of our study.

$$\Delta SI_t = f(\text{EPU}, X)$$

Here, Δ denotes change, and SI specifies the stock index price of a given month t . This is the dependent variable we are investigating. On the right-hand side, we have a function f , which comprises our primary variable, economic policy uncertainty (EPU). Lastly, X is a set of independent macroeconomic variables consisting of the consumer price Index (CPI), currency in circulation (Currency), the economic political uncertainty index (EPU), exports (EXP), imports (IMP), foreign direct investment (FDI), Karachi inter-bank offered rate (KIBOR), oil prices, reserves of Pakistan's central bank (Reserves), tax collected (TAX), and US dollar exchange currency rate (EXCH).

We have developed two models, represented as follows in regression form.

$$KSE_{100} = C + C_1 * CPI + C_2 * CURRENCY + C_3 * EPU + C_4 * EXPORT + C_5 * FDI + C_6 * IMP + C_7 * KIBOR + C_8 * OIL_PRICE + C_9 * RESE + C_{10} * TAX + C_{11} * EXCH + (\text{error term}) \quad (1)$$

$$KMI_{30} = C_0 + C_1 * CPI + C_2 * CURRENCY + C_3 * EPU + C_4 * EXPORT + C_5 * FDI + C_6 * IMP + C_7 * KIBOR + C_8 * OIL_PRICE + C_9 * RESE + C_{10} * TAX + C_{11} * EXCH + (\text{error term}) \quad (2)$$

Equation 1 for the KSE 100 index represents data for the conventional index, while Equation 2 represents data for the Islamic *Shariah* Index.

The same equation above can be written in the ARDL approach, which is defined as follows, where Y_t is the dependent variable represented as a vector. The variables in $(X')_t$ are allowed to be purely I(0) or I(1). and β are coefficients, and finally, ϵ_{jt} denotes the error term.

$$Y_t = \gamma_{oj} + \sum_{i=1}^p \delta Y_{t-i} + \sum_{i=0}^q \beta'_j X_{t-i} + \epsilon_{jt} \quad (3)$$

Table 1

Description of variables used in this study

Variable	Symbol	Category	Measurement Unit (Monthly)	Source
Karachi Meezan Index 30 Index	KMI30	Dependent Variable	Index Stock Return	Pakistan Stock Exchange (www.psx.com.pk)
Karachi Stock Exchange 100 Index	KSE100	Dependent Variable	Index Stock Return	Pakistan Stock Exchange (www.psx.com.pk)
Consumer Price Index	CPI	Independent Variable	CPI Index Value	State Bank of Pakistan (https://www.sbp.org.pk)
Money Supply Pak Rupee Physical Currency Notes in Circulation	CURRENCY	Independent Variable	Currency Notes in Circulation	State Bank of Pakistan (https://www.sbp.org.pk)
Economic Policy Uncertainty Index	EPU	Independent Variable	Index Value	https://www.policyuncertainty.com/
Exports	EXPO1	Independent Variable	Value in Rupees for Exports	State Bank of Pakistan (https://www.sbp.org.pk)

Foreign Direct Investment	FDI	Independent Variable	Foreign Direct Investment Value	State Bank of Pakistan (https://www.sbp.org.pk)
Imports	IMP	Independent Variable	Value in Rupees for Imports	State Bank of Pakistan (https://www.sbp.org.pk)
Karachi Inter-bank Offered Rate	KIBOR	Independent Variable	Interest Rate	State Bank of Pakistan (https://www.sbp.org.pk)
Petrol Price	OIL_PRICE	Independent Variable	Price of Petrol	
Federal Reserve of the Country	RESE	Independent Variable	Federal Reserve of the Economy	State Bank of Pakistan (https://www.sbp.org.pk)
Tax Collected	TAX	Independent Variable	Taxes Collected	State Bank of Pakistan (https://www.sbp.org.pk)
United States Dollar Currency Rate	EXCH	Independent Variable	US Dollar Rate	xe.com Currency Website

Results and Analysis

Table 2 reports descriptive statistics for all variables used in the study, including their means, medians, and standard deviations.

Table 2

Descriptive statistics

Descriptive Statistics	CPI	CUR-RENCY	EPU	EXPORT	FDI	IMP	KIBOR	KMI30	KSE100	OIL_PRICE	RESE	TAX	EXCH
Mean	0.011	0.01	0.07	0.02	-0.092	0.01	0.09	0.01	0.01	0.01	0.01	0.07	0.01
Maximum	0.69	0.11	2.40	0.71	36.0	0.32	0.14	0.23	0.17	0.34	0.31	1.02	0.11
Minimum	-0.41	-0.06	-0.55	-0.31	-92.50	-0.20	0.07	-0.24	-0.23	-0.27	-0.18	-0.61	-0.06
Std. Dev.	0.16	0.03	0.44	0.15	8.52	0.10	0.03	0.06	0.06	0.06	0.07	0.34	0.02
Observations	143	143	143	143	143	143	143	143	143	143	143	143	143

Source: Authors' calculations

Unit Root Test

The unit root test provides information about the stationarity of a data distribution (Liu et al., 2023). We have used the unit root tests, including the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, at levels and 1st differences, for robustness and comparison of results. The results of the test for all the variables are summarized in Table 3. The unit root test results show that all variables except KIBOR are stationary at the level. It can be safely concluded that the series are integrated at level $I(0)$ except for KIBOR, which is stationary at first difference $I(1)$. Therefore, we are compelled to use the ARDL method for analysis. The detailed table for the unit root test can be viewed in Table 3

In the subsequent step, after examining the order of integration, we used the vector autoregression (VAR) lag-length criteria to determine the optimal lag length. Based on the model selection criteria, we finalized the model with the optimal lag length. Two criteria, namely the SC Schwarz information criterion and the HQ Hannan-Quinn criterion, indicate that lag 1 is optimal. We chose the same for the monthly data series for both the KSE and KMI indices and move forward.

Table 3

Unit root test

Variables	Intercept				Intercept and Trend			
	ADF		PP		ADF		PP Test	
	Level	1st Difference	Level	1st Difference	Level	1st Difference	Level	1st Difference
KMI30	-12.69***	-9.01***	-12.82***	-98.36***	-12.87***	-8.98***	-13.21***	-97.80***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
KSE100	-12.23***	-10.35***	-12.29***	-75.56***	-12.35***	-10.31***	-12.49***	-75.21***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.0)	(0.0)	(0.0)
EPU	-17.94***	-11.29***	-21.84***	-108.52***	-17.94***	-11.24***	-22.65***	-108.06***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
EXCH	-10.65***	-15.56***	-10.64***	-45.58***	-10.74***	-15.50***	-10.72***	-45.42***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
EXP01	-12.89***	-6.94***	-23.89***	-116.34***	-12.85***	-6.96***	-23.84***	-118.10***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.000)	(0.0)	(0.0)	(0.0)
IMP	-12.49***	-10.49***	-19.19***	-93.16***	-12.48***	-10.47***	-19.31***	-93.65***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)

CPI	-10.61***	-4.50***	-10.58***	-52.31***	-10.69***	-4.48***	-11.01***	-52.08***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.02)	(0.0)	(0.0)
KIBOR	-1.86	-9.13***	-1.91	-9.28***	-1.66	-9.15***	-1.75	-9.30***
	(0.35)	(0.00)	(0.32)	(0.0)	(0.76)	(0.0)	(0.72)	(0.00)
FDI	-11.79***	-10.08***	-11.79***	-133.82***	-11.82***	-10.04***	-11.82***	-132.94***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
RESE	-11.02***	-11.40***	-11.05***	-60.05***	-11.00***	-11.35***	-11.03***	-59.95***
	(0.000)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
TAX	-3.30***	-7.99***	-96.02***	-213.39***	-3.48***	-8.00***	-106.27***	-214.21***
	0.02	0.0	0.0	0.0	0.05	0.0	0.0	0.0
CURRENCY	-3.24***	-9.89***	-17.63***	-64.94***	-3.31*	-9.83***	-17.57***	-71.08***
	(0.02)	(0.0)	(0.0)	(0.0)	(0.07)	(0.0)	(0.0)	(0.0)
OIL_PRICE	-10.85***	-10.08***	-10.81***	-64.01***	-10.85***	-10.05***	-10.82***	-68.13***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)

Note: ***, **, and * denote values that are significant at 1%, 5%, and 10%, respectively.

Source: Authors' calculations

ARDL Bound Test

Table 4 presents the empirical results of the ARDL bound testing approach. If F is above its upper bound, co-integration exists. Our results indicate that the calculated F statistic of 13.7 for the KMI 30 Index is greater than $I(1)$ 2.94, 3.24, 3.5, and 3.86 at the significance levels of 10%, 5%, 2.5%, and 1%, respectively. For the KSE 100 index, the F value of 14.39 is greater than 8.21, 9.8, 11.79, and 9.81 at the significance levels of 10%, 5%, 2.5%, and 1%, respectively. For our results, the value of F exceeds the upper bound at the 10%, 5%, 2.5%, and 1% significance levels. The bound test is significant; therefore, the null hypothesis is rejected. Results indicate that the variables are cointegrated, suggesting a long-term relationship.

Table 4

ARDL bound test for long run and co-integration

ARDL Bounds Test – KMI 30			ARDL Bounds Test – KSE 100		
Test Statistic	Value	k	Test Statistic	Value	k
F-statistic	13.7	10	F-statistic	14.39	11
Critical Value Bounds			Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound	Significance	I(0) Bound	I(1) Bound
10%	1.83	2.94	10%	6.58	8.21
5%	2.06	3.24	5%	8.21	9.8
2.5%	2.28	3.5	2.5%	9.8	11.79
1%	2.54	3.86	1%	11.79	9.81

Source: Authors' calculations

ARDL Long-Term Analysis

Table 5 shows the long-term analysis. The results show that CPI, EPU, exports, and oil prices have a negative but insignificant effect on stock returns. FDI, imports, and KIBOR interest rates, on the contrary, have a positive yet again insignificant impact on stock returns. The USD currency has a negative but significant effect on stock returns for both the KMI and KSE indices. For more details, a 1% decrease in USD will lead to an improvement of 0.94 for the KMI index and 0.83 for the KSE 100 index, respectively.

Table 5

Long-run analysis for the KMI 30 index and the KSE 100 index

Long-Run Coefficients for KMI 30					Long-Run Coefficients for KSE 100			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-0.03	0.04	-0.84	0.40	0.00	0.03	-0.06	0.95
EPU	-0.01	0.01	-0.69	0.49	-0.01	0.01	-0.79	0.43
EXP01	-0.01	0.04	-0.36	0.72	-0.01	0.04	-0.32	0.75
FDI	0.00	0.00	0.18	0.86	0.00	0.00	0.63	0.53
IMP	0.06	0.05	1.04	0.30	0.05	0.05	0.90	0.37
KIBOR	0.04	0.19	0.23	0.82	0.03	0.18	0.16	0.87
OIL_PRICE	-0.03	0.11	-0.29	0.78	-0.04	0.11	-0.38	0.70

RESE	0.06	0.08	0.86	0.39	0.07	0.07	0.89	0.38
TAX	0.01	0.03	0.22	0.83	0.02	0.03	0.76	0.45
EXCH	-0.94	0.26	-3.59	0.00***	-0.83	0.25	-3.29	0.00***
C	0.01	0.02	0.79	0.43	0.01	0.02	0.73	0.47

Note: ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Source: Authors' calculations

Table 6 shows short-run ARDL results for the Islamic index KMI 30. The results show that the variables currency, taxes, and exchange have a negative and significant effect at the 5% level of confidence. However, reserves have a positive but significant effect also at the 5% level of significance. Oil prices and Imports have a positive impact, with EPU and currency having a negative but significant effect at the 10% level of significance. The value of lagged ECT_{t-1} is negative and significant. This is the speed of adjustment for the short-term model towards equilibrium. In addition, the diagnostic tests reveal no issues of serial correlation, multicollinearity, heteroscedasticity, or autocorrelation. The R -squared value is 0.609, indicating that the model explains 61% of the variation in the independent variables.

Similarly, the short-run ARDL analysis for the conventional KSE100 index shows that the variables currency, tax, and exchange all have negative and significant effects at the 5% significance level. Reserves, however, have a positive yet considerable effect. The variable EPU has a negative and significant impact at the 10% significance level. The lagged ECT has a negative, significant effect.

We present the CUSUM and CUSUM square diagrams, from which we conclude that the parameters are stable in the short run. Similarly, for the KSE 100 index, the observed R -squared is 3.39 with a p -value of 0.18, indicating that the null of no serial correlation cannot be rejected. For the KSE 100 index, the observed R -squared is 1.5397 with a p -value of 0.2185, indicating we cannot reject the null hypothesis. Instead, we accept the null hypothesis that there is no serial correlation among the variables. The lagged ECT has a negative, significant effect.

Table 6

Findings of the dynamic ARDL estimated model – short-run for KMI 30 & KSE 100 indices

Short-Run Coefficients for KMI30					Short-Run Coefficients for KSE100			
Variables	Coefficient	Std. Error	t-Statistic	Prob.	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002	0.004	0.04	0.9	-0.008	0.004	-0.001	0.9
D(CPI)	0.01	0.02	0.4	0.6	-0.002	0.02	-0.09	0.9
D(CURRENCY)	-0.3	0.1	-2.6	0.01**	-0.3	0.1	-3.07	0.002**
D(EPU)	-0.01	0.007	-1.7	0.07*	-0.01	0.007	-1.9	0.05*
D(EXP01)	0.001	0.02	0.004	0.9	0.005	0.02	0.02	0.9
D(FDI)	-0.001	0.004	-0.3	0.7	0.001	0.0003	0.4	0.6
D(IMP)	0.05	0.03	1.8	0.07*	0.04	0.03	1.4	0.1
D(KIBOR)	-0.8	0.8	-0.9	0.3	-0.5	0.8	-0.6	0.5
D(OIL_PRICE)	0.1	0.06	1.9	0.05*	0.09	0.06	1.5	0.1
D(RESE)	0.1	0.05	2.6	0.008***	0.1	0.05	2.5	0.01**
D(TAX)	-0.05	0.01	-5.0	0.0***	-0.04	0.009	-4.8	0.0
D(EXCH)	-0.7	0.1	-3.9	0.002***	-0.6	0.1	-3.5	0.005***
ECT (-1)	-1.04	0.08	-11.9	0.0***	-1.03	0.08	-11.8	0.0

Note: ***, **, and * denote significance at 1%, 5%, and 10% respectively. D denotes first difference.

Source: Authors' calculations

To assess the model's stability, we use the CUSUM test. Our parameters are stable. The cumulative sum of squared residuals (CUSUM) test helps determine whether the regression coefficients are changing systematically. To assess data normality, the CUSUM test in Figures 1 and 2 has been used. As per the CUSUM test, the parameters are stable in the short run.

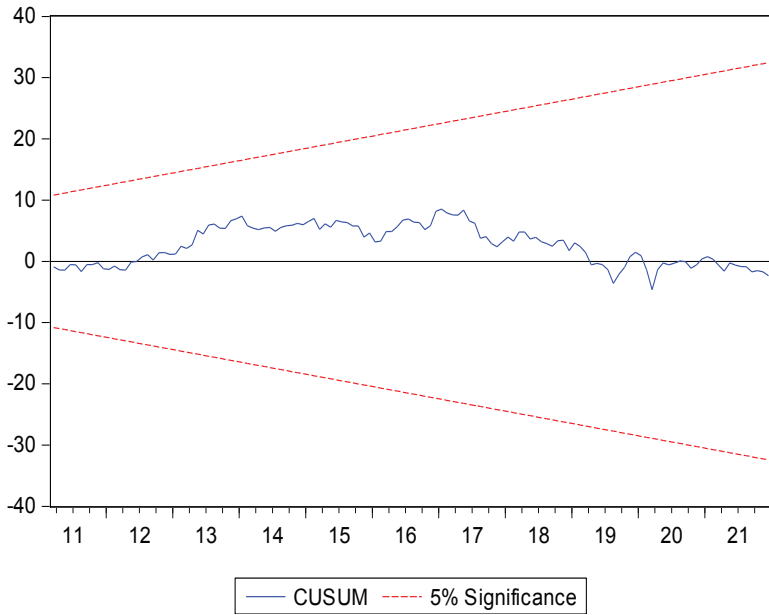


Figure 1: CUSUM Diagram for KMI30 Index

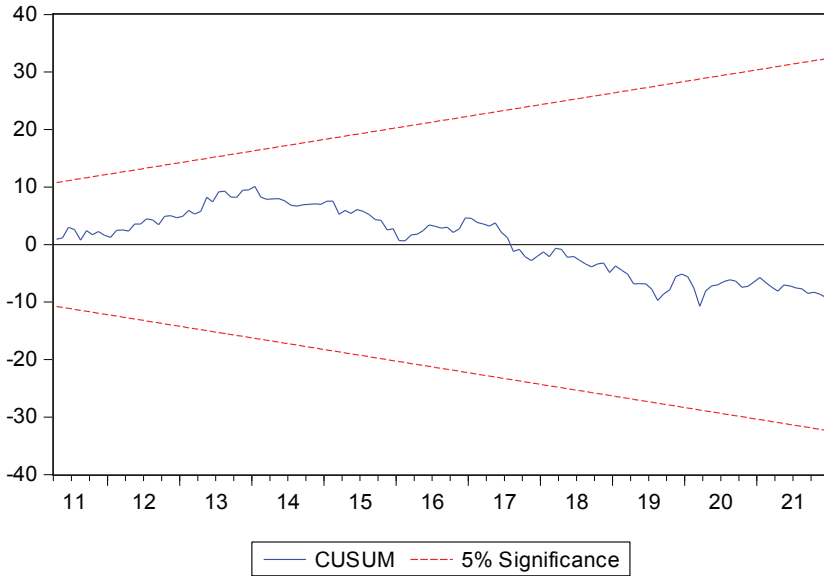


Figure 2: CUSUM Diagram for KSE100 Index

Note: The straight line represents critical bounds at 5% significance level.

Source: Authors' calculations

Quantile Regression

We note that EPU has no significant long-term effect on either the KMI30 or the KSE100 indices at the 5% level. However, the analysis is significant at the 10% level when broadened to both the KMI30 and KSE100 indices. To study the impact of this single variable, we use quantile regression (QR), which can analyze the effect of an independent variable across different quantiles of the dependent variable. QR (Koenker & Bassett, 1978) is a technique for examining functional relationships among variables across different portions of the probability distribution. It works effectively even when the distribution is nonnormal or asymmetrical. Thus, we have checked the behavior of EPU at 5% intervals in both models. Although the ARDL model, due to its equation formulation, accounts for the explained parameters, quantile estimation provides additional insight into changes in specific quantiles (Liu et al., 2023). QR can be used to observe the impact of an explanatory variable on various quantiles of the dependent variable (Chang et al., 2020).

The QR general equation for a given variable X_i with variable Y_i can be stated as follows:

$$QY_i(\tau | x) = \alpha(\tau) + X_i' \beta(\tau) \quad (4)$$

Following Dawar et al. (2021), $QY_i(\tau | x)$ indicates the τ conditional quantile of Y_i . The value of τ lies between 0 and 1. Additionally, $\alpha(\tau)$ accounts for the unobserved effect in the quantile model, and X includes all the independent variables that are responsible for changes in Y .

Similarly, substituting the general equation for our models, we get equations 5 and 6 as follows for the QR study of our variable EPU:

$$QKMI30_i(\tau | x) = \alpha(\tau) + EPU_i' \beta(\tau) \quad (5)$$

$$QKSE100_i(\tau | x) = \alpha(\tau) + EPU_i' \beta(\tau) \quad (6)$$

Table 7 presents the results for the QR estimates of variable EPU across the KMI30 and KSE100 models. We have analyzed the performance of the EPU coefficient at 5% intervals, yielding 20 quantiles. This approach allows us to capture the full distributional impact of EPU across both lower and upper tails of stock market returns, rather than focusing only on average effects. Using a finer grid of quantiles (e.g., 5th, 10th, 15th, etc.) provides a more detailed view of how the relationship varies under extreme market conditions, normal periods, and high-return scenarios. This enhances the robustness and interpretability of the QR results. The EPU coefficients are negative across all quantiles. This supports the principle that

EPU negatively affects stock prices across both Islamic and conventional indices. At higher quantiles above 50%, the values are statistically significant for the KMI30 model. However, we observe 5% significance in the KSE100 model at 20%, 25%, 30%, 35%, and 40%. This means the KSE100 index is more responsive to EPU than the KMI30 index. From an investor's point of view, stocks are more robust and resilient if they are part of the *Shariah*-compliant KMI30 index (Kannadhasana & Das, 2019).

Table 7

Quantile regression estimates of variable EPU for models KMI30 and KSE100

Quantile	KMI30		KSE100	
	Coefficient	Prob.	Coefficient	Prob.
0.05	-0.001	(0.9)	-0.01	(0.3)
0.10	-0.01	(0.5)	-0.01*	(0.06)
0.15	-0.002	(0.9)	-0.017	(0.1)
0.20	-0.01	(0.1)	-0.01**	(0.03)
0.25	-0.01	(0.18)	-0.02**	(0.02)
0.30	-0.01*	(0.07)	-0.02	(0.01)
0.35	-0.01	(0.13)	-0.02**	(0.03)
0.40	-0.01	(0.15)	-0.02	(0.04)
0.45	-0.01	(0.16)	-0.017	(0.1)
0.50	-0.01	(0.34)	-0.01	(0.1)
0.55	-0.02**	(0.04)	-0.02**	(0.03)
0.60	-0.02**	(0.04)	-0.02**	(0.01)
0.65	-0.03***	(0.00)	-0.02**	(0.01)
0.70	-0.03***	(0.003)	-0.03***	(0.003)
0.75	-0.03***	(0.004)	-0.03***	(0.006)
0.80	-0.03***	(0.003)	-0.03***	(0.001)
0.85	-0.03***	(0.004)	-0.03***	(0.007)
0.90	-0.03***	(0.005)	-0.01	(0.6)
0.95	-0.02	(0.3)	-0.03*	(0.09)

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

Source: Authors' calculations

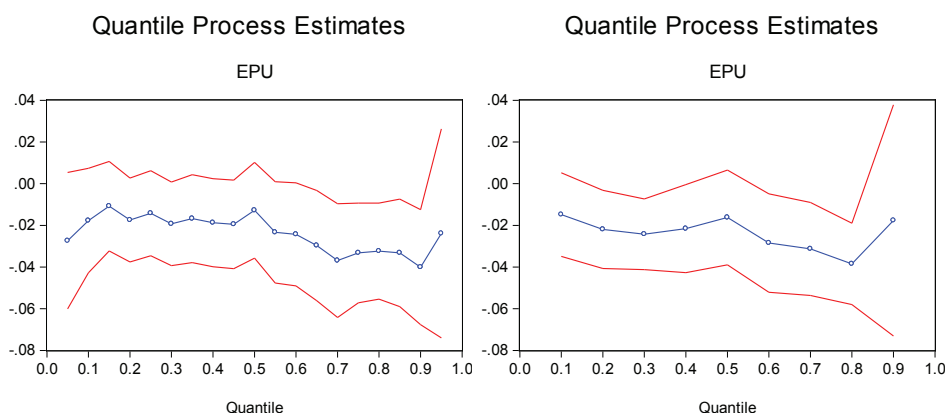


Figure 3: Quantile Process Estimates – EPU for KMI30 and EPU for KSE100

Source: Authors' calculations

Table 8 shows the results for the equality of slopes between different percentiles. The test value of 0.0105 for the 50th and 55th percentiles is statistically significant, indicating asymmetric dependence on EPU. However, we fail to reject the hypothesis for heterogeneity in other percentiles. The Wald's test is insignificant for both the KMI30 and KSE100 indices. This supports our previous conclusion that there is evidence of upper tail independence for EPU. In other words, the market is more susceptible to reacting to changes in EPU when the study horizon is broadened to the 50th or higher quantiles (Kannadhasana & Das, 2019; Guo et al., 2018).

Table 8

Heterogeneity test for equality of slopes and Wald Test

EPU							
KMI30				KSE100			
Test Summary	Chi-Sq	d.f.	Prob.	Test Summary	Chi-Sq	d.f.	Prob.
Wald	171.72	198	0.9115	Wald	187.74	198	0.6883
Percentile		Test Stat	p-Value	Test Stat		p-Value	
05,10		-0.009	0.46	-0.010		0.16	
10,15		-0.006	0.45	0.006		0.37	
15,20		0.006	0.31	0.008		0.89	
20,25		-0.003	0.55	0.005		0.91	
25,30		0.005	0.33	0.001		0.70	

30,35	-0.002	0.60	-0.002	0.62
35,40	0.001	0.69	-0.002	0.96
40,45	0.007	0.86	-0.003	0.47
45,50	-0.006	0.10	-0.002	0.69
50,55	0.010	0.06*	0.006	0.23
55,60	0.009	0.86	0.006	0.27
60,65	0.005	0.37	-0.004	0.93
65,70	0.007	0.27	0.003	0.55
70,75	-0.003	0.58	0.005	0.33
75,80	-0.008	0.88	0.001	0.72
80,85	0.008	0.90	-0.006	0.30
85,90	0.006	0.50	-0.013	0.53
90,95	-0.016	0.42	0.018	0.49

Note: ***, **, and * denote significance at 1%, 5%, and 10% respectively.

Source: Authors' calculations

Factors like omitted variables or reverse causality can affect the relationship between EPU and stock returns. To address this, we used QR because it is less sensitive to outliers and unexpected shocks. This helps reduce bias compared to simple mean-based models. We also included key control variables to limit the risk of missing essential influences. Since QR does not rely on strict assumptions about the data, it gives a more flexible view of how EPU affects returns at different levels. While endogeneity cannot be removed entirely, this method helps minimize its impact and provides more reliable insights.

Furthermore, purposive sampling was used in our study to ensure that data from specific indices and variables directly relate to EPU and Islamic and conventional stock performance. This method allows us to focus on the most relevant and meaningful data sources rather than a broad sample that may not reflect our research aims. We acknowledge that purposive sampling can limit generalizability and may introduce selection bias. To reduce these limitations, we clearly defined our selection criteria, relied on established data sources, and cross-checked the dataset for consistency and accuracy. These steps help ensure that the sample remains reliable and aligned with the study's purpose (Mabire, 2025).

Discussion and Conclusion

This study investigates the dynamic relationship between EPU and stock market returns for both the Islamic (KMI30) and conventional (KSE100) indices in the Pakistan Stock Exchange, utilizing monthly data from 2010 to 2022. While existing literature has primarily examined EPU's impact on conventional stocks (Nazir et al., 2021; Ftiti & Hadhri, 2018), our research provides a novel comparative analysis of *Shariah*-compliant versus conventional equities. The long-run analysis identified the USD exchange rate as the only significant negative factor affecting both indices. At the same time, short-run ARDL results revealed distinct patterns: for the KMI30 Islamic index, taxes and USD showed negative effects, whereas reserves had a positive impact, with oil prices becoming significant at the 10% level. The conventional KSE100 index demonstrated similar negative responses to currency, taxes, and USD, while maintaining a positive relationship with reserves.

To address initial ARDL model limitations, we employed QR, revealing that Islamic stocks exhibit greater resilience to EPU shocks beyond the 50th percentile, consistent with previous findings (Kannadhasan & Das, 2019; Aziz et al., 2020). This robustness stems from their asset-backed nature, unlike conventional stocks, which are vulnerable to economic fluctuations (Bhutto et al., 2024). Our results support Rawat and Arif's (2018) assertion about differential index performance during periods of economic-political instability. In Pakistan's volatile economy, where investors often shift wealth to gold or the USD during market turbulence, the KMI30 demonstrates significantly lower volatility than its conventional counterpart. These findings suggest that Islamic equities may offer more stable investment alternatives during economic uncertainty, particularly for risk-averse investors. Future research could extend this analysis to other Islamic economies and transitional markets to assess the broader applicability of these findings.

Recommendations

The results suggest that EPU significantly affects stock market performance, particularly in both conventional and Islamic segments. To mitigate these impacts, policymakers could focus on enhancing transparency and consistency in fiscal and monetary policies, as clear guidance reduces market anxiety and speculative behavior. Strengthening communication around policy decisions, providing timely economic data, and promoting investor education can also help build confidence, especially in *Shariah*-compliant markets where ethical and stable frameworks are valued. The-

se measures can help stabilize investor sentiment, support market liquidity, and reduce the adverse effects of uncertainty on the KMI30 and KSE100 indices.

Limitations

First, our data scope is limited to the KMI30 and KSE100 indices, which may not capture the behavior of smaller firms or other sectors, potentially affecting the generalizability of the findings to the broader Pakistani stock market. Second, while QR provides detailed insights across the return distribution, it relies on certain assumptions, such as the correct specification of control variables and the absence of severe measurement errors. These assumptions may influence the robustness of the results, particularly under extreme market conditions. Additionally, the study focuses on historical data; therefore, the findings may not fully reflect future shifts in economic policy or investor behavior. We have acknowledged these limitations and emphasized that caution is needed when extrapolating the results beyond the sampled indices or different economic contexts, while still highlighting the study's contribution to understanding the effects of EPU on Islamic and conventional stocks.

Policy Implications

The results indicate that EPU affects investor confidence and market participation, particularly in *Shariah*-compliant segments. For policymakers, this underscores the importance of creating a stable, transparent regulatory environment to encourage broader participation in both conventional and Islamic financial markets. Enhancing digital access to financial services and promoting awareness of Islamic finance products can improve financial inclusion, especially for underserved or risk-averse populations. Clear policy signals and consistent regulation not only stabilize markets but also help build trust among investors, fostering broader engagement in the financial system and supporting inclusive economic growth.

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